



**TOWN OF GRAFTON**  
GRAFTON MEMORIAL MUNICIPAL CENTER  
30 PROVIDENCE ROAD  
GRAFTON, MASSACHUSETTS 01519  
(508) 839-5335 ext 120 • FAX (508) 839-4602  
www.grafton-ma.gov

**PLANNING BOARD**

**APPLICATION FOR APPROVAL OF A PRELIMINARY PLAN**

Application No. \_\_\_\_\_

**APPLICANT & PROPERTY OWNER INFORMATION**

NAME D&F Afonso Builders, Inc.  
STREET 189 Main Street CITY/TOWN Milford  
STATE MA ZIP 01757 TELEPHONE 508--478-7286  
NAME OF PROPERTY OWNER (if different) same  
Deed recorded in the Worcester District Registry of Deeds Book 34122 Page 57

**CONTACT INFORMATION**

NAME same  
STREET \_\_\_\_\_ CITY/TOWN \_\_\_\_\_  
STATE \_\_\_\_\_ ZIP \_\_\_\_\_ TELEPHONE \_\_\_\_\_

**PROJECT LOCATION:**

STREET AND NUMBER 100 Westboro Road  
ZONING DISTRICT OLI / R-20 ASSESSOR'S MAP 12 LOT #(S) 22

**PROJECT/PLAN INFORMATION:**

PLAN TITLE Village at Institute Road PLAN DATED: October 15, 2014  
PREPARED BY (Engineer) Guerriere & Halnon, Inc., Michael Y. Weaver, P.E.  
STREET 1029 Providence Road CITY/TOWN Whitinsville  
STATE MA ZIP 01588 TELEPHONE 508-234-6834

The undersigned, being the applicant as defined under Chapter 41, Section 81-L, for approval of a proposed subdivision shown on the above referenced plan being land bounded as follows:  
Westboro Road to the north and Institute Road to the east

hereby submits said plan as a **PRELIMINARY** plan in accordance with the Rules and Regulations of the Grafton Planning Board and makes application to the Board for approval of said plan. The undersigned's title to said land is derived from Commonwealth of Massachusetts Division of Capital Asset Management and Maintenance  
by deed dated 6/13/2004 and recorded in the Worcester District Registry of Deeds Book 34122, Page 57,  
registered in the Worcester Registry District of Land Court, Certificate of Title No. \_\_\_\_\_; and said land is free of encumbrances except for the following: None

The undersigned hereby applies for the approval of said **PRELIMINARY** plan by the Board, and in furtherance thereof hereby agrees to abide by the Board's Rules and Regulations

Applicant's Signature Domingos Afonso Date: 11/4/2014  
Property Owner's Signature (if not Applicant) \_\_\_\_\_ Date: \_\_\_\_\_



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**APPLICATION FOR SPECIAL PERMIT**

Application No. \_\_\_\_\_

**APPLICANT & PROPERTY OWNER INFORMATION**

NAME D&F Afonso Builders, Inc.  
STREET 189 Main Street CITY/TOWN Milford  
STATE MA ZIP 01757 TELEPHONE 508--478-7286  
NAME OF PROPERTY OWNER (if different from Applicant) same  
Deed recorded in the Worcester District Registry of Deeds Book 34122 Page 57

**SITE INFORMATION:**

STREET AND NUMBER 100 Westboro Road  
ZONING DISTRICT OLI / R-20 ASSESSOR'S MAP 12 LOT #(S) 22  
LOT SIZE 47.8 ac FRONTAGE 360' Westboro Road, 1722' Institute Road  
CURRENT USE Vacant

**PROJECT/PLAN INFORMATION:**

PLAN TITLE Village at Institute Road  
PREPARED BY (name/address of PE/Architect) Guerriere & Halnon, Inc., Michael Y. Weaver, P.E.  
DATES October 15, 2014

Use for which Special Permit is sought: (refer to § 3.2.3.1 of the Zoning Bylaw - Use Regulation Table):

Section 5.3, Major Residential Development

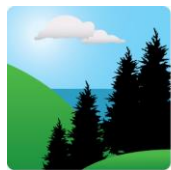
Cite all appropriate sections of the Zoning By-Law which pertain to this Application, Use and Site:  
Section 5.3, Major Residential Development

**TO THE GRAFTON PLANNING BOARD:**

The undersigned, being the APPLICANT named above, hereby applies for a SPECIAL PERMIT to be granted by the Planning Board and certifies that, to the best of APPLICANT'S knowledge and belief, the information contained herein is correct and complete.

Applicant's Signature *Domingos Afonso* Date: 11/4/2014

Property Owner's Signature (if not Applicant) \_\_\_\_\_ Date: \_\_\_\_\_



**Guerriere &  
Halnon, Inc.**  
ENGINEERING & LAND SURVEYING

www.guerriereandhalnon.com

Est. 1972

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W-2658

**PROJECT SUMMARY**  
**“THE VILLAGE AT INSTITUTE ROAD”**

The project entails the development of a portion 47.79 acre parcel of land located along the westerly side of Institute Road and the southerly side of Westboro Road. The parcel is bisected by a zoning line with the northern portion being located within an Office and Light Industry district and the southern portion, approximately 33.1 acres, being located in a R—20 Medium Density Residential district. The proposed project is to divide the existing parcel approximately along the zoning line and develop the southern 33.1 acres with a residential subdivision. The project site is mostly wooded with 0.83 acres of wetlands and a vernal pool. The applicant is proposing to develop the property by constructing either a conventional or flexible residential subdivision. An information summary of each concept is as follows.

**Conventional Subdivision**

1. There will be 46 lots with a minimum area of 20,000.
2. There will be three (3) roadways totaling 3,252 ft. in length.  
Road A = 863 ft.  
Road B = 1,872 ft  
Road C = 517 ft
3. There will be approximately 3.23 acres of open space to protect the existing wetland, vernal pool and 100 foot buffer to the wetland/vernal pool area.
4. The site will be serviced by municipal water and sewer.
5. Runoff will be controlled in accordance with stormwater management guidelines.

**Flexible Subdivision**

1. There will be 51 lots with a minimum area of 10,000.
2. There will be three (3) roadways totaling 3,127 ft. in length.  
Road A = 2,412 ft.  
Road B = 263 ft  
Road C = 452 ft
3. There will be approximately 12.7 acres of open space with walking trails providing passive recreation and protection of wetland/vernal pool resource areas.
4. The site will be serviced by municipal water and sewer.
5. Runoff will be controlled in accordance with stormwater management guidelines.

**Soils**

The Soil Survey of Southern Worcester County depicts the soil type on the site as Map Unit 422, Canton fine sandy loam, Hydraulic Soil Group “B”.



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W-2658

November 6, 2014

Town of Grafton Planning Board  
Grafton Memorial Municipal Center  
30 Providence Road  
Grafton, MA 01519

Re: **The Village at Institute Road**  
**Special Permit Application**  
**Preliminary Plan Application**

Dear Board Members:

On behalf of the Applicant, D&F Afonso Builders, Inc, 189 Main Street, Milford, MA 01757, Guerriere & Halnon, Inc. (G&H) hereby submits a Special Permit Application for a Major Residential Development per Section 5.3 of the Town of Grafton Zoning By-Laws and a Preliminary Plan Application per Section 3.2 of the Town of Grafton Rules and Regulations Governing the Subdivision of Land. The proposed project is names "The Village at Institute Road". The site currently consists of approximately 47.8 acres, of which approximately 33.1 acres will be utilized for the Residential Development and the remaining 14.7 acres, located in an OLI zoning district, will be retained by the Applicant for future development. Enclosed please find the following:

1. Application for a Special Permit – Major Residential Development
2. Application for Approval of a Preliminary Plan
3. Certificate of Good Standing
4. Assessors Plan
5. Certified Abutters List
6. Project Summary
7. Waiver Request
8. Environmental and Community Impact Analysis
9. Response Letter to 2009 Final Review Comments
10. Check in the amount of \$4,325 for Filing Fee (\$500 plus \$75 per lot, 51 lots)
11. Check in the amount of \$2,000 for Peer Review Fee
12. Check in the amount of \$112 for Advertising Fee
13. Two (2) sets of Abutters Labels
14. Two (2) sets of stamped envelopes
15. Two (2) copies of the Traffic Impact and Access Study
16. CD with PDF copy of all documents
17. Five (5) sets of 24"x36" plans of a Conventional Subdivision
18. Twenty (20) sets of 11"x17" plans of a Conventional Subdivision
19. Five (5) sets of 24"x36" plans of a Flexible Subdivision
20. Twenty (20) sets of 11"x17" plans of a Flexible Subdivision

The Conventional Plan contains forty-six (46) lots. The Flexible plan contains a total of fifty-one (51) lots. We respectfully request the Planning Board allow these additional units per Section 5.3.5.2 Bonus Provision. We are requesting approximately an 11% increase over the amount shown on the Conventional Plan. The following Design Guidelines have been incorporated into the design of the project to attain the 15% bonus provision:

- §5.3.13.b – 100' vegetated buffer to surface waters and wetlands.
- §5.3.13.f – Protection of natural elements
- §5.3.13.h – Landscaping screens of low visual interest
- §5.3.13.j – Pedestrian circulation system
- §5.3.13.k – Contiguous open space
- §5.3.13.l – Access to common land

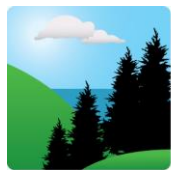
I trust this information is sufficient for your needs. If you have any questions or comments, please call me at 508-234-6834.

Sincerely

***Guerriere & Halnon, Inc.***

A handwritten signature in blue ink, appearing to read "Michael Y.", followed by a long horizontal line.

Michael Y. Weaver, P.E.  
Project Manager



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November 6, 2014

Town of Grafton Planning Board  
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Re: **The Village at Institute Road**  
**Special Permit Application**  
**Preliminary Plan Application**  
**Waiver Request**

Dear Board Members:

On behalf of the Applicant, D&F Afonso Builders, Inc., Guerriere & Halnon, Inc. respectfully request the following *waivers in strict compliance* with the Rules and Regulations Governing the Subdivision of Land for the above referenced project

1. **Section 4.1.2.1.b) Cuts and Fills** - The Applicant requests a waiver of strict compliance with this section to allow a fill of greater than six (6) feet. In the Flexible Development plan, the grading of Road A requires a fill greater than six (6) feet deep between Sta 13+19 and Sta 14+86. The maximum depth of fill along the right sideline of the roadway is approximately eleven (11) feet. All other roadways in both the Conventional Development Plan and the Flexible Development Plan comply with this regulation.
2. **Section 4.2.1.2 Curbs and Berms** - The Applicant requests a waiver of strict compliance with this section to allow the use of sloped granite curb where roadway grades exceed 2% and along curves with a radius of less than 250 feet. A significant amount of the project roads will exceed the 2% slope criteria and a majority of the curves have a radius of less than 250 feet.

I trust this information is sufficient for your needs. If you have any questions or comments, please call me at 508-234-6834.

Sincerely  
**Guerriere & Halnon, Inc.**

Michael Y. Weaver, P.E.  
Project Manager



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November 6, 2014

Town of Grafton Planning Board  
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Re: **The Village at Institute Road**  
**Special Permit Application**  
**Response to 2009 Final Review Comments**

Dear Board Members:

In December, 2009, Guerriere & Halnon, Inc. (G&H), on behalf of the Applicant, D&F Afonso Builders, Inc. (D&F), submitted an Application for a Special Permit – Major Residential Development and an Application for Approval of a Preliminary Plan. The Board opened the Public Hearings for these Applications and several meetings were held discussing the project. Graves Engineering, Inc. (Graves) was retained by the Board to review and comment on the plans' conformance with applicable "Rules and Regulations Governing the Subdivision of Land; Grafton, Massachusetts"; "Grafton Zoning By-Law"; and standard engineering practice.

As part of Graves' review, they prepared two Plan Review letters dated January 14, 2010 and March 9, 2010 in which they provided engineering and compliance comments on the two submitted development plans. Based on the comments contained in these two letters; G&H made revisions to the design plans and prepared response letters dated February 18, 2010 and May 17, 2010. At this time, the question regarding the status of Institute Road (public or private) became the controlling factor on the project. It was evident that until this issue was clarified, the project would not be proceeding.

Graves prepared a third and final comment letter dated August 12, 2010 to address the last submission to the Board. As the Public Hearing was in an extended continuance to address the status of Institute Road, G&H did not respond to this letter.

In January 2011, with no decision having been reached regarding the status of Institute Road, the Applicant requested to withdraw the Applications without prejudice.

On November 4, 2013 the Worcester County Superior Court issued a judgment that the Town had acquired Institute Road by prescription, confirming its status as a public road.

We are aware that the current application is completely separate from previous application and that a complete Engineering review will be performed as part of this submission. That being stated, we feel it prudent to provide responses to the final comments so that the Board will have a full appreciation of what has previously occurred and where the design currently stands in comparison to the previous submission.

This letter is to address the final review comments contained in the letter from Graves Engineering, Inc. dated August 12, 2010. Graves' comments are shown in *italics* followed by our responses in **bold**.



## **Zoning By-Law**

### **Both Conventional and Flexible Plans**

1. *(1/14/10) We are concerned about pedestrian traffic outside the project limits, specifically along Institute Road. Currently there are no sidewalks along Institute Road. One particular area of concern is approximately 280 feet south of the northern project entrance where there is a horizontal curve and vertical curve in Institute Road with an embankment on the west side of the road. This area does not accommodate pedestrian traffic. Currently there is little development in the area that generates significant pedestrian traffic. The project proposes approximately 50 dwelling units, which is likely to increase pedestrian traffic along Institute Road. The plans propose sidewalks along the project roads; with the proposed sidewalks terminating at Institute Road.*

*Consideration should be given to creating a "looped" sidewalk/walking path system. Ideally, connecting the sidewalks at northern and southern entrances by way of a sidewalk along Institute Road might be preferable. However, the vernal pool on the west side of Institute Road would add complexity to sidewalk design and permitting. An alternative may be to connect the sidewalk at the cul-de-sac of Road C (on both the conventional and flexible plans) to Institute Road north of the vernal pool via the existing gravel road (with any necessary improvements to the gravel road) and constructing a sidewalk on the western side of Institute Road from the gravel road to the northern entrance. Either alternative would provide a sidewalk on Institute Road at the horizontal curve located approximately 280 feet south of the northern entrance. The Planning Board, DPW or other Town departments may have opinions relative to a sidewalk system; therefore we defer further discussion to the Town. (s5.3.13.j & SR&R§4.1.2.1.c)*

**(2/18/10) For both the Conventional and Flexible plans, a walking path has been added from the end of the sidewalk of the internal cul-de-sac through the woods to the north of the Vernal Pool to Institute road. A sidewalk has been added along the west side of Institute Road from the end of the path to the sidewalk at the northern entrance.**

*(3/9/10) The plans were revised to provide a walking path from the end of the sidewalk at the cul-de-sac through the woods, across the existing gravel road and connecting to a new sidewalk on the west side of Institute Road. A new sidewalk on Institute Road would be constructed from the walking path to the northern project entrance. As proposed, the walking path would connect to the Institute Road sidewalk approximately 150 feet (conventional plan) to 190 feet (flexible plan) north of where the gravel road intersects Institute Road. In either case the walking trail passes over a hill and will have a significant downgradient slope toward Institute Road - 3 horizontal : 1 vertical (or 33%). A slope this steep must be avoided, especially near Institute Road. Sections 4.10 and 5.6 of the "Rules and Regulations Governing the Subdivision of Land" have specific requirements for trails, bikeways and walkways, including maximum slope. As an alternative, it appears the walking trail could be routed south of the hill along or near the gravel road, thereby eliminating a steep down-slope at the approach to Institute Road. Again, we defer further discussion to the Town.*

**(3/17/10) The grade of all walking trails has been revised to comply with the regulations. The walking trail was not relocated to the existing gravel road based on concerns raised by the Board on the close proximity of the gravel road to the existing vernal pool.**

*(8/12/10) The proponent has re-graded the walking path near Institute Road, providing a slope of 8%±. However, this option requires relatively extensive clearing/grading. Approximately 50 feet west of Institute Road the earth cut will be up to eight feet deep and the clearing width will vary between 22 feet and 45 feet. Again, we defer further discussion to the Town.*

**In order to provide the walking trail as requested, avoid the vernal pool, and comply with the walking trail design regulations, the submitted trail design was required.**



### **Conventional Plans**

2. *(1/14/10) Several of the zoning yard setbacks need to be revised because they are not offset the proper distances and/or are not parallel with the property line. This is apparent at Lots 22 & 23, 32 & 33, and 35 & 36. (s3.2.3.2)*

**(2/18/10) The zoning setback lines have been revised**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

### **Flexible Plans**

3. *(1/14/10) The proponent should specify which Design Guidelines are being addressed for the bonus provision (i.e. increase from 46 conventional lots to 51 flexible lots). (s5.3.5.2)*

**(2/18/10) The following Design Guidelines have been incorporated into the design of the project to attain the 15% bonus provision:**

- **§5.3.13.b – 100' vegetated buffer to surface waters and wetlands.**
- **§5.3.13.f – Protection of natural elements**
- **§5.3.13.h – Landscaping screens of low visual interest**
- **§5.3.13.j – Pedestrian circulation system**
- **§5.3.13.k – Contiguous open space**
- **§5.3.13.l – Access to common land**

*(3/9/10) The design engineer cited specific sections of the Design Guidelines for which the bonus provision was applied. As noted in comment #1 above, we are concerned about the slope of the walkway near the intersection of Institute Road and therefore question whether the bonus provision of 35.3.13.j would apply. We understand the Planning Board will consider any applicability and/or approval of the bonus provision.*

**(3/17/10) As noted above, the grade of all walking trails has been revised to comply with the regulations.**

*(8/12/10) Acknowledged. The proponent has re-graded the walking path near Institute Road, providing a slope of 8%±. However, this option requires relatively extensive clearing/grading. Preservation of the existing hill and vegetation may be preferable.*

**As noted hereinbefore, in order to provide the walking trail as requested, avoid the vernal pool, and comply with the walking trail design regulations, the submitted trail design was required**

### **Subdivision Rules & Regulations**

#### **Both Conventional and Flexible Plans**

4. *(1/14/10) The locus does not have a north arrow. (s3.2.3.1)*

**(2/18/10) North arrows have been added to the locus plans**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

5. *(1/14/10) We are concerned about turning movements at the intersection of Institute Road and the proposed streets. GEI superimposed vehicle turning templates on the plans. For a single-unit vehicle (e.g. parcel delivery truck) exiting the site and turning right, the vehicle will encroach upon opposing traffic in Institute Road by approximately four feet at both intersections. The plans currently show 40-foot radius curbing at the intersections which we believe was intended to minimize any conflict in turning movements. However, curbing radii are typically no greater than 30 feet; larger radii can result in vehicles "cutting corners" and conflicting with opposing vehicles. Also, a semi-trailer exiting the southern entrance by turning right will*

*have difficulty maneuvering within the paved portion of the roads. Institute Road should be widened at least at the project entrances and/or pavement transition lanes should be added, and the curb radii should be reduced to no greater than 30 feet. (§4.1.2.2.b)*

**(2/18/10) The width of Institute Road has been increased to 26 feet at both entrances. A 15 to 1 (per MHD design guidelines) or 75 foot minimum transition has been proposed to from the existing road width to the proposed road width.**

**Curb radius has been reduced to 30 feet.**

*(3/9/10) Acknowledged. The plans were revised to widen Institute road to 26 feet at the project entrances and to provide transitions, and to show 30-foot curb radii at the intersections.*

**(3/17/10) No additional comment.**

6. *(1/14/10) Based upon measurements made during our site visit, in the vicinity of the project Institute Road generally has a paved width of approximately 21 feet; the width varied between 20.5 feet and 22 feet. Although the Traffic Impact and Access Study presented "future build" traffic estimates in vehicles per hour during peak times, it did not present a "future build" estimate for vehicles per day (vpd). Using the Study's estimated background growth of 5.6% over five years and the estimated project generated traffic of 560 vpd (75% northbound and 25% southbound), we estimated that under "future build" conditions traffic flow along Institute Road would be approximately 1,700 vpd north of the project and approximately 1,400 vpd south of the project. Grafton Subdivision Rules and Regulations identify certain road design parameters (e.g. road width) based in part upon traffic flow. The existing width of Institute Road doesn't meet the minimum requirement for any of the street widths specified in the Rules and Regulations. In short, the existing width of Institute Road is less than current Town standards and the project would result in increased traffic and turning movements on Institute Road. Therefore, we defer to the Town if improving (e.g. widening) Institute Road should be considered beyond the intersections at the new project entrances.*

**(2/18/10) We are continuing to review the status and condition of Institute Road. We have initiated conversations with various departments and agencies within the Town and are attempting to contact the State to obtain additional information. GPI, the traffic engineer for the project, has reviewed the roadway for its adequacy to carry the predicted traffic volumes. Please refer to the attached letter from GPI that addresses the adequacy of Institute Road and the site roadway separation. Any additional information that we obtain will be forwarded to the Board.**

*(3/9/10) No further comment.*

**(3/17/10) Information was previously submitted to the Board and Town Counsel regarding the clarification of the status of Institute Road. With respect to proposed improvements along Institute Road, Sheet 20 has been added to both the Conventional and Flexible plans. A proposed cross section for Institute Road has been added. Based on discussions with the Board, the cross section depicts a 2-foot wide graded shoulder being added along both sides of Institute Road from the southern extent of the project (south property line) north to Westboro Road. The cross section also depicts a grass strip and concrete sidewalk where it is noted to be installed from the northern entrance southward to the walking trail.**

**Sheet 20 also depicts the proposed revision to the road profile of Institute Road. The existing crest vertical curve at the high point just north of the vernal pool does not provide the required sight distance for the posted speed limit. The proposed road profile has been designed to comply with the Mass Highway's design requirements for a 30 MPH crest curve, the posted speed for the roadway. The revision will require the existing high point of the roadway to be lowered by approximately 2.5 feet. The lowering of the roadway, along with the additional clearing required in this area for the shoulder and sidewalk, will greatly increase the sight distances in this area and thus the safety of the roadway.**

*(8/12/10) No further comment.*

**The status of Institute Road has been clarified by the Worcester Superior Court, in their Judgment dated November 4, 2013. In that judgment, the Judge found that the Town has acquired Institute Road by prescription.**

**Additional information is provided under Comment 20 below.**

#### **Conventional Plans**

7. *(1/14/10) There are several isolated areas within the rights-of-way where the proposed cut is greater than 6'. These areas include Road A between STA 1+58± & STA 2+05± (left side only) and between STA 6+25± & STA 8+25±, Road B between STA 15+50± & STA 15+85± (right side only), and Road C between STA 2+35± & STA 3+20±. (§4.1.2.1 .b)*

**(2/18/10) The site layout was selected to minimize, as much as possible, the cuts and fills on the site. Due to site topography, and in order to comply with the road grade requirements noted in the Rules and Regulations, cuts and fills in excess of 6 feet were required.**

*(3/9/10) No further comment - the areas were listed above to aid the Planning Board in identifying the areas where cuts exceed 6 feet. We defer any further consideration of this issue to the Planning Board.*

**(3/17/10) Refer to response above**

*(8/12/10) No further comment – the areas were listed above to aid the Planning Board in identifying the areas where cuts exceed 6 feet. We defer any further consideration of this issue to the Planning Board.*

**The roadway profiles and grading were reviewed and revised so that all areas within the rights-of-way comply with the maximum cut or fill of six (6) feet.**

8. *(1/14/10) There are abutting properties to the west of the project owned by the Town of Grafton. The conventional plans do not provide any type of access from the proposed roads to the Town's parcels, whether for vehicular or pedestrian access. We defer to the Town of Grafton what type of access, if any, is needed. As part of the access, consideration should be given to maintaining or re-routing the path on Lot 7 so it can connect to Road B. (§4.1.2.1 .d & §4.1.2.1 .e; GZBL §5.3.13.i)*

**(2/18/10) It may be possible to relocate the path across Lot 7 so that it runs between Lots 6 and 7, but this would require permission from the Town to perform work on their property so that the path could be relocated.**

*(3/9/10) The plans were revised to show a path along the property line of Lots 6 and 7. Sections 4.10 and 5.6 of the "Rules and Regulations Governing the Subdivision of Land" have specific requirements for trails, bikeways and walkways. These requirements must be incorporated into the plans during definitive plan design. This new path would also require relocating a portion of the path on the Town-owned property. We understand the issue of connecting the subdivision sidewalk/trail system to the abutting land will be further addressed by the Town.*

**(3/17/10) As noted above, the grade of all walking trails has been revised to comply with the regulations.**

*(8/10/10) The plans were revised to show a path along the property line of Lots 6 and 7. Sections 4.10 and 5.6 of the "Rules and Regulations Governing the Subdivision of Land" have specific requirements for trails, bikeways and walkways. These requirements must be incorporated into the plans during definitive plan design. This new path would also require relocating a portion of the path on the Town-owned property. We understand the issue of connecting the subdivision sidewalk/trail system to the abutting land will be further addressed by the Town.*

**As noted above, the grades of all walking trails will comply with the regulations.**

## Flexible Plans

9. (1/14/10) *There is no water main on Road A between stations 0+00 and 7+00. It appears that this was a drafting error; the water main will have to be provided on the definitive plans. (§3.2.4.1 .f)*

**(2/18/10) The water main in this area has been added to the plans.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

10. (1/14/10) *There are abutting properties to the west of the project owned by the Town of Grafton. The flexible development plans propose open space contiguous to the abutting land, but Lot FL-8 is proposed over an existing path. Consideration should be given to re-routing the path so it connects to Road A. (§4.1.2.1 .d & §4.1.2.1 .e; GZBL §5.3.1 3.i)*

**(2/18/10) The path can be relocated to the west of Lot 8 and connect to Road A.**

*(3/9/10) The plans were revised to provide a walkway or trail west of Lot 8. Sections 4.10 and 5.6 of the "Rules and Regulations Governing the Subdivision of Land" have specific requirements for trails, bikeways and walkways. These requirements must be incorporated into the plans during definitive plan design.*

**(3/17/10) As noted above, the grade of all walking trails has been revised to comply with the regulations.**

*(3/9/10) The plans were revised to provide a walkway or trail west of Lot 8. Sections 4.10 and 5.6 of the "Rules and Regulations Governing the Subdivision of Land" have specific requirements for trails, bikeways and walkways. These requirements must be incorporated into the plans during definitive plan design.*

**As noted above, the grades of all walking trails will comply with the regulations.**

11. (1/14/10) *There are several isolated areas within the rights-of-way where the proposed cut or fill is greater than 6'. There are excessive cuts along Road A between STA 0+47± & STA 2+07±, 12+05± & STA 13+20± (left side), and STA 15+18± & STA 16+75. There is an excessive fill on Road A between STA 13+38± & STA 14+45±. There is an excessive cut on Road C between STA 0+07 & STA 3+80. (§4.1.2.1.b)*

**(2/18/10) The site layout was selected to minimize, as much as possible, the cuts and fills on the site. Due to site topography, and in order to comply with the road grade requirements noted in the Rules and Regulations, cuts and fills in excess of 6 feet were required.**

*(3/9/10) No further comment -the areas were listed above to aid the Planning Board in identifying the areas where cuts or fills exceed 6 feet. We defer any further consideration of this issue to the Planning Board.*

**(3/17/10) Refer to Response Above**

*(8/10/10) No further comment -the areas were listed above to aid the Planning Board in identifying the areas where cuts or fills exceed 6 feet. We defer any further consideration of this issue to the Planning Board.*

**The roadway profiles and grading were reviewed and revised in an attempt to comply with the maximum cut or fill of six (6) feet. The revised Flexible Development plans comply with this requirement is all locations except one. That location is a fill on the right side of Road A between Sta 13+19 and Sta 14+86. We were unable to make this area comply based on the required roadway grades and existing site topography.**

## **General Engineering Comments**

### **Both Conventional and Flexible Plans**

12. *(1/14/10) Based upon our site visit (driver's eye being 15 feet from the major road edge-of-pavement and 3.5 feet above the proposed minor road) and information on the grading plans, there are sight distance obstructions looking south from the northern project entrance. The shoulder of Institute Road south of the northern project entrance will likely have to be excavated and re-graded to provide adequate sight distance. Removal of vegetation may also be required. Based upon Table 3 of the Traffic Impact and Access Study, the sight distance should be suitable for a design speed of at least 40 mph.*

**(2/18/10) As noted in our response to Question 1 above, the plans have been revised to include a sidewalk along the west side of Institute Road from the northern entrance heading south. The grading and clearing required and depicted for sidewalk provide the required sight distance.**

*(3/9/10) Acknowledged. The plans were revised to show re-grading along the road shoulder for sidewalk construction and sight distance improvement.*

**(3/17/10) In addition to than noted above, Sheet 20 has been added to both sets of drawings. This sheet depicts a proposed road cross section and road profile modification for Institute Road.**

13. *(1/14/10) The intersection curb radii within the project should be no greater than 30 feet. Curb radii of 40 feet were proposed.*

**(2/18/10) Curb radius has been reduced to 30 feet.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

### **Conventional Plans**

14. *(1/14/10) The vertical curve between STA 0+02.24 and STA 4+82.24 on Road B is too long. The K-value of 120 indicates that there will be approximately 192 feet (of the 480 foot vertical curve) where the tangent slope is less than the minimum 0.8%. This could be a potential drainage issue and an area subject to excessive debris/sand accumulation. At a vertical curve such as this tangent slopes less than 0.8% are inevitable, but should be not excessively long. For comparison, a vertical curve with a K-value of 40 (160 foot long vertical curve) would have approximately 64 feet where the tangent slope is less than 0.8%. The vertical curve should be revised.*

**(2/18/10) The vertical crest curve has been redesigned with a K-value of 40 (160 foot vertical curve). As noted, this will result in a total curve length of 64 feet with a grade less than 0.8%.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

15. *(1/14/10) On the definitive plans, the Road "C" curb transition at the cul-de-sac entrance (station 4+75+1-left) should be smoothed.*

**(2/18/10) The curb transition has been revised.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**



### **Flexible Plans**

16. (1/14/10) *On the definitive plans, the Road "C" curb transition at the cul-de-sac entrance (station 4+20+/- right) should be smoothed.*

**(2/18/10) The curb transition has been revised.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

### **General Comments**

17. (1/14/10) *The existing grade profiles of the left and right sides of the rights-of-way on the profiles are were not labeled.*

**(2/18/10) The profiles have been labeled.**

*(3/9/10) Labels were added to Flexible Development Plans but not to the Conventional Development Plans. If the Conventional Plans are to be revised for other reasons, then labels should be added to the profile sheets; otherwise the revisions should be made on the definitive plans if conventional development is chosen.*

**(3/17/10) Labels have been added to the plans.**

*(8/10/10) Acknowledged. Labels have been added to the profile for the Conventional Development Plans.*

**No additional comment.**

18. (1/14/10) *Datum elevations must be provided on each profile. For example, the profiles on Sheets 15 through Sheet 19 of the Preliminary Flexible Development Plan are missing elevations.*

**(2/18/10) Datum or grid elevations have been added to all sheets.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

19. (1/14/10) *Tangent slopes must be clearly defined on the profile sheets. For example, there are not any slopes on the first portion of the profile on Sheet 15 of the Preliminary Flexible Development Plan.*

**(2/18/10) The profiles have been revised so that slopes are visible.**

*(3/9/10) Acknowledged. The plans were revised.*

**(3/17/10) No additional comment.**

### **Additional Comments**

20. (8/10/10) *Both the Flexible and Conventional Development Plans were revised to include vertical alignment revisions on Institute Road. Changes to the vertical alignment are proposed between station 9+32.90 and station 12+09.05. The existing grades in this area are proposed to be lowered approximately 2.4'. Vertical road re-alignment would require lowering the existing water main accordingly. The k-values for the two vertical curves in this area correspond to design speeds of 30 MPH (k=19 for crest and k=37 for sag vertical curves per Exhibits 4-26 and 4-27 in MassHighway Project Development & Design Guide, 2006 Edition). The proposed revisions are certainly an improvement compared to existing conditions.*

*However, consideration should be given to designing for a speed greater than 30 MPH. Per Table 3 of the Traffic Impact Report, the 85<sup>th</sup> percentile observed travel speeds were 40 MPH and 37 MPH in the southbound and northbound lanes, respectively. In a conceptual manner, we evaluated the potential for utilizing crest vertical curves for 35 MPH (Alternate 1) and 40 MPH (Alternate 2) design speeds. For comparison, the following table shows pertinent information associated with existing conditions, the proposed alterations and potential options for vertical re-alignment.*

*Table 1 – Institute Road Vertical Curve Data*

<i>Design Option</i>	<i>Crest Vertical Curve “k”</i>	<i>Design Speed, MPH*</i>	<i>Approximate Length of New Vertical Curve, Feet</i>	<i>Approximate Depth of Deepest Earth Cut, Feet</i>	<i>Approximate Length of Water Main Alterations, Feet</i>
<i>Existing</i>	<i>7.8+/-</i>	<i>21 to 22</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<i>Proposed</i>	<i>19</i>	<i>30</i>	<i>226</i>	<i>2.5</i>	<i>160</i>
<i>Alternate 1</i>	<i>29</i>	<i>35</i>	<i>365</i>	<i>4.0</i>	<i>300</i>
<i>Alternate 2</i>	<i>44</i>	<i>40</i>	<i>524</i>	<i>7.5</i>	<i>470</i>

*\* Per MassHighway Project Development & Design Guide, 2006 Edition*

*In evaluating Alternate 1, it appears feasible to revise the crest vertical curve to achieve a “k” of 29. Please note, a “k” of 28 is required for Minor Streets per Grafton Subdivision Rules and Regulations §4.1.5.3. By our estimate, the vertical curve would extend from station 8+38+/- to station 12+04+/- . This alternate would require an earth cut of up to approximately 4 feet and re-laying approximately 300 feet of the existing water main in order to maintain minimum cover requirements.*

*The feasibility of constructing Alternate 2 is more questionable than Alternate 1. The vertical curve would extend from station 7+39+/- to station 12+63+/- (almost to the culvert from the vernal pool). Depending upon findings during final design, runoff from the road near the vernal pool area may be directed farther north instead of to its current discharge point near the culvert. Finally, earth excavation would be deep – approximately 7.5 feet - and approximately 470 feet of water main alterations would be required.*

*In summary, the design engineer has proposed improvements to the vertical alignment of Institute Road. The proposed work is an improvement compared to existing conditions, but meets a design speed which is less than observed 85<sup>th</sup> percentile speeds. To understand the feasibility of constructing improvements to meet a greater design speed, we evaluated two alternatives to the proposed vertical alignment. The construction of Alternate 1 appears to be feasible and would accommodate a design speed of 35 MPH. The feasibility of constructing Alternate 2 appears to be questionable primarily because of the extent of earth excavation. We defer further consideration of this comment to the Planning Board and would be glad to answer any questions you may have relative to our evaluation.*

**Sheet 20 of both plan sets have been revised to depict a 35 MPH crest vertical curve with a design “k” value of 29. The new curve length is 345.77 feet and results in a maximum cut at the peak of the hill of 4.7 feet. The revised profile also requires approximately 350 lf of water main to be replaced as a lower elevation.**

In summary, we have attempted to comply with every comment that was raised by Graves. The only comment that we could not comply with is Item 11, where there is approximately 170 feet of the right side of a road where the fill depth is greater than six (6) feet. Other than this, and our request to use sloped granite curbing, we feel that the project is full compliance with the Board’s regulations. If you have any questions with respect to the information contained herein, please call me at 508-234-6834

Sincerely

**Guerriere & Halnon, Inc.**



Michael Y. Weaver, P.E.  
Project Manager



**ENVIRONMENTAL AND COMMUNITY IMPACT ANALYSIS  
“THE VILLAGE AT INSTITUTE ROAD”**

**NATURAL ENVIRONMENT:**

- A. **Air and Noise Pollution** – During construction, property in the immediate area will be impacted by noise and dust generated by the equipment utilized in building the roads and installing the utilities. The dust is generally controlled by using water to irrigate the areas traversed by construction vehicles. With the exception of the of the buildings on the Commonwealth of Massachusetts property on the east side of Institute Road, all work will be greater than 500 feet from existing residences and/or buildings; and after construction of the first 150 feet of road at the southern end of the site, all work will be greater than 500 feet from all existing buildings. The preservation of Undisturbed Vegetated Open Space will keep dust from reaching beyond the boundaries of the project. After the end of construction, each home site will be stabilized with some sort of ground cover so the dust level will be reduced to the normal level of a residential neighborhood.

Construction vehicles and activities will generate noise. The level can be minimized through proper maintenance of vehicles. The projects vegetated buffers will help muffle the sounds of construction as well as the significant distance from the majority of the proposed construction to the nearest residences.

The vernal pool identified on the property will be protected. Both the Conventional and Open Space designs maintain a minimum of a 100 foot buffer to the vernal pool.

- B. **Storm Water** – The project drainage system will be designed in compliance with the Massachusetts Stormwater Regulations. First, the rate and volume of storm water discharge will be mitigated through detention basin(s). These structures are designed to mitigate flows off site. The drainage system is also designed to remove suspended solids in the storm water runoff. This is achieved through the use of deep sump catch basins, sediment forebays, detention basins, grass swales and, possibly, a stormwater particle separator. The projected detention basin is located in suitable soils for the recharging of the ground water table. The drainage for the project is discharged towards existing water bodies.
- C. **Land** – The project has been designed to avoid the most sensitive areas on the property. A wetland and vernal pool is located on the east side of the site along Institute Road. The project has been designed so that the wetland, vernal pool and the 100 foot buffer to the wetland/vernal pool area is protected. It is anticipated that the roadway and housing construction will necessitate the removal of ledge. The blasted material will be crushed onsite and utilized as roadway and driveway base. A Sedimentation and Erosion Control Plan will be prepared as part of the Definitive Subdivision filing for review and comment by the Grafton Planning Board and the Grafton Conservation Commission. Prior to construction, a Notice of Intent will be filed with the Environmental Protection Agency for storm water discharges associated with construction activities (NPDES Permit). The NOI will include a detailed “Storm Water Pollution Prevention Plan”, which details pre-construction, during construction and post-construction stabilization methods. It also outlines maintenance and inspection procedures for the storm water management facilities constructed as part of the project.

- D. **Plants and Wildlife** – The project site is currently forested. At a minimum, approximately 3.2 acres of open space will be preserved to protect the existing wetland and vernal pool located on the site. Wildlife in the project area will most likely adapt to the disruption by limiting their activities to the preserved as Open Space, to the 88+ acres of Town owned land to the west or to the 81+ acres state owned land to the east. The wetlands and vernal pool onsite have been protected by inclusion into the Open Space area, providing an important source of water and food for wildlife.

Based on the on-line Natural Heritage maps, the project area is not within an Estimated or Priority Habitat Area.

- E. **Water Supply** – The project will be serviced by the Grafton Water District. Assuming the Flexible Development with 51 lots and an average of 262.5 gallons per day per household, the water demand is estimated at 13,340 gallons per day. We will meet with the Water district to determine what upgrades, if any, the system will require in order to provide adequate water volume and pressure throughout the project for drinking water purposes, and fire flow protection.
- F. **Sewage Disposal** – Based on Title 5 flow calculations (required by the Sewer Department), the estimated average daily wastewater flow from the project is 22,440 gallons per day. The effluent will be directed to a new wastewater pump station to be located near Westboro Road. The pump station will pump wastewater through a force main to the existing gravity sewer system. The nearest sewer manhole is located by the western entrance of Equipment Car Care of Grafton, approximately 800 feet to the west. From this location, it will flow by gravity to the Worcester Street pump station where it is pumped to the sewage treatment plant located off Depot Street. After treatment the water is discharged into the Blackstone River.

## MAN-MADE ENVIRONMENT

- A. **Existing Neighborhood Land Uses** – The property to the north of the site has a mixture of businesses and residential houses. The property to the west is undeveloped and owned by the Town of Grafton. The area to the east is owned by the Commonwealth of Massachusetts and a majority of this land is undeveloped. The land to the south is undeveloped. A portion of this land is owned by the Commonwealth of Massachusetts with the remaining land owned by a private citizen.
- B. **Zoning** – The portion of the site to be developed is zoned for residential use. The remaining land to the north, which will be separated from the project area, is zoned for Office and Light Industrial.
- C. **Architecture** – New England Colonial

## PUBLIC SERVICES

- A. **Schools** – US Census statistics indicate that the average family size is 3.07 people. In the Town of Grafton the average household size is 2.54 persons. The Massachusetts Association of Realtor's quotes the following statistics: more than 60% of current homebuyers have no children. A four bedroom home in Massachusetts will generate approximately .74 school age children per unit. This means that the project will add about 38 children to the K through 12 system. For the 2012-2013 school year, there were 3,042 students enrolled in Grafton Preschool to 12. Therefore this project would account for a 1.25% increase in the student population if all the houses were built in the same year and all the children would enter the school system in the same year. Based on the 2012-2013 School Department budget, Grafton spends approximately \$8,284 per student

in the system. Assuming that all students entered the school system at the same time, the school budget will increase by approximately \$314,788 or approximately \$6,172.32 per house. These values do not include reimbursements from the state.

- B. **Police** – There are roughly 104 miles of road in the Town of Grafton and 18,000 people. The project will result in an additional 3,252 feet of new road or about 0.6 miles. So the project will result in a 0.58% increase in the amount of roadways to be patrolled. A patrol car should not take more than 3 minutes to travel over the roads in the project. Current US Census Bureau statistics indicate that the average family contains 3.07 people. This means that the project will add about 157 people to the population of Grafton. This amounts to an increase of 0.87%. During the fiscal year July 2012 to July 2013, the Town employed 25 police officers and staff or 1 for every 720 people. Based on these numbers, it is not anticipated that an additional officer will be required to protect the proposed additional people and roads. Based on fiscal year 2013, the Police Department spent approximately \$109.53 per person living in the Town of Grafton. This projects to an additional cost of \$17,196 for the project or \$337.18 per house.
- C. **Fire** – The Fire Department responded to 390 calls during 2013. Based on population figures, this translates to an additional 3.4 calls in a year for the increase in population. Based on fiscal year 2013, the Fire Department spent approximately \$37.70 per person living in the Town of Grafton. This projects to an additional cost of \$5,918 for the project or \$116.05 per house.
- D. **Highway** – The Highway Department maintained approximately 104 miles of roadway during 2013 with a budget of \$1,422,813.54. Upon full build out, the project will add approximately 0.60 miles of roadway to the Town's roadway system. Based on a direct proportion it is estimated that the Highway Department's budget will increase by 0.58% as a result of the new roadways. This projects to an additional cost of \$8,209 for the project or \$160.95 per house.
- E. **Solid Waste** – The 2013 budget for sanitation totaled \$839,006 for a total population of 18,000. Based on a per capita rate of \$46.62, it is estimated that the budget for the Sanitation Department will increase by approximately \$7,319 for the project or 143.51 per house.
- F. **Recreation** – At a minimum, the project will set aside 3.2 Acres of Open Space along Institute Road. This open space will surround the existing wetland, vernal pool and 100 foot buffer to the wetland/vernal pool area.
- G. **Traffic** – A full Traffic Study was submitted with the Special Permit Application. The study shows that the project has little or no significant impact to the intersections in close proximity to the project site.

## **AESTHETICS**

- A. **Lighting** – Street lights are proposed at all street intersections and approximately every 300 feet along the proposed roadways in accordance with Subdivision Rules & Regulations. The lights shall be installed to conform to the type and style specified by the Grafton Board of Selectmen. Lights must be of a type approved by Massachusetts Electric Company.
- B. **Landscaping** – Trees will be planted in accordance with the Rules and Regulations of the Grafton Planning Board. The trees will be of a nursery stock conforming to the standards of the American Association of Nurserymen. The type shall be in accordance with the recommended street trees and shrubs found in Schedule D of the Rules & Regulations. A grass strip shall be planted between the traveled way and the sidewalk.

- C. **Visual** – The project is designed so that only 5 lots will be developed along Institute Road. Additionally, the proposed open space will abut Institute road providing a natural buffer to a majority of the subdivision. The geometry of the roadways and the distance of the building lots from the existing roads and abutting parcels will prevent the project from having a significant impact on immediately abutting roads and parcels.
- D. **Planning** – Careful consideration of the existing topography and resource areas on the site was utilized in the layout of the proposed roadways for both the Flexible and Conventional development plans. The existing wetland, vernal pool and 100 foot buffer to the wetland/vernal pool resource areas will be protected and incorporated in a proposed open space parcel. Also, the alignments for the roadways were selected in an attempt adhere as closely with the existing topography and reduce the extent of the overall site grading requirements.

## COST BENEFIT ANALYSIS

The 2013 estimated operating budget for the Town was \$52,630,523. Of this amount, \$19,978,456.87, or 38%, was Estimated Receipts from the following sources; the State (Cherry Sheet) (22.9%), Local (11.4%), Other (2.4%), and Free Cash (1.2%). The remaining \$32,652,066.13, or 62%, was to be raised through the tax rate. Based on the 2014 tax rate of \$15.26 per \$1,000 valuation and an average sale price of \$500,000, a home in the proposed project should generate approximately \$7,630 in Real Estate Taxes. The estimated Actual and Net costs generated per house is as follows:

	<u>Actual Cost</u>	<u>Net Cost</u>
School System	\$6,172.32	\$3,829.32
Police Protection	337.18	209.18
Fire protection	116.05	72.00
Highway	160.95	99.85
Solid Waste	<u>143.51</u>	<u>89.03</u>
Total	\$6,930.00	\$4,299.38

Based on the 2013 Grafton Town Report, the Projected Actual Cost for Town Services is \$6,930 per lot with a Net Cost to the tax rate of \$4,299.38 (62% of actual costs). Based on the Net Costs of the above noted services, it appears that each new housing unit in the project will generate a surplus of \$3,330.62 in tax revenue. Based on the current economic conditions, if we assumed a worst case scenario where 100% of the State's reimbursement and Free Cash were removed from the budget, the Tax Rate would be burdened with 86.2% of the costs. This results in a cost of \$5,970.51 per lot with a surplus of \$1,659.49 in tax revenue.